Design & Development of Service Oriented Architecture Interface for Mobile Device Testing

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ABSTRACT:

Mobile devices becoming more complex and evolving new with a variety of best features and functionalities. Nowadays new different OS versions have been released. A bunch of latest devices will have hit the market and with that mobile application testing become much more complex and challenging for all of us. There is no doubt specific testing approaches need by those mobile device. Service-Oriented Architecture (SOA) promises important benefits to today's organizations. SOA's architectural style that supports loosely coupled services to enable flexibility in an interoperable, technology adaptive manner which is related to the quality and scalability of the architecture. This paper proposes the SOA interface design and development to test the mobile device.

Keywords: SOA Interface; Mobile Device; testing; COM Technique; Fault Injection Technique; Fault Taxonomy.

I.   INTRODUCTION

Handheld devices are evolving and becoming increasingly complex with the continuous addition of features and functionalities. Mobile applications are nothing but the a natural extension to the current wired phone. The testing of the mobile application is difficult due to the daily improvements in application software of mobile phones.

To design a new interface we have to consider following valuable factors:
- First analyze the target device environment which get directly interact with the user.
- Design the new approach by using which we can reuse the different test cases in our testing environment .
- It must have an ability for data processing while communication with specific memory capacity.

Thus, a testing approach that is highly intrusive to the target system under test may affect the actual result of the testing. Finally, testing behaviors is highly interactive.

Service-oriented architectures (SOA) is loosely coupled with complex interdependencies. SOA is the architectural style that supports loosely coupled services to enable business flexibility in, technology adaptive manner. SOA consists of a compound set of modules of different services that support a dynamic and flexible re-configurable end-to-end communication and make easy to integrate with high security and scalability.

SOA is based on the COM technique having an ability to reuse the components which maintains the quality of the architecture. The main purpose of this paper is to use the advantages of SOA to solve the problems in mobile device testing field, also to bring forward a new way of technology and thinking for the implementation of testing with a more general framework.

SOA benefits in four basic categories:
- reducing integration expense
- increasing asset reuse
- increasing business agility
- reduction of business risk

SOA allow a run time composition and exchange of independently developed services. Thus, the SOA paradigm is predestined here for the easy development of software systems and distributed applications. Specifically in mobile settings possibility to provide functionalities to mobile devices with restricted resources. The factors in the area of wireless communication technologies   as SOA and the common advances facilitate the realization of better mobile business applications.

We propose a new testing approach based on SOA in order to overcome the existing limitations, which are currently more pressing in mobile usage scenarios. To develop largely de-coupled system and a highly componentized that makes application lifecycle management easier to operate is the goal of every SOA architect. The purpose of this paper to build an test interface to solve the problems in mobile device test with the goal to define a more general methodology and to bring forward a new way of mobile device testing with taking advantages of SOA.

II.   PROBLEM DEFINITION

Mobile development has a set of distinctive features and the specific challenges can be mentioned: support of many hardware and software platforms, interconnections with other applications, correct work with a variety of sensors, high requirements for users experiences and the quality of the user interface and the existence of web mobile and hybrid applications that incorporate all of these challenges to web development. All of these features comes under the complexity and specifics the need of mobile testing. Additionally, a support of two novel concepts—multidirectional testing and flexible integration of testing techniques—was stated as a main requirement to the platform.

Testing SOA could be viewed as a complex computing problem and the key is to divide it into smaller and more manageable components to build quality into these component modules. For system level and application level we have to build sophisticated, maintainable and reusable test case library.

III.   OBJECTIVES

It is really hard to do the mobile device test due to its constantly update and improvements. With the improvements and constantly upgrades in mobile application software makes difficult to test the device. For going to start the test design, first we have to consider the most important issues of the test interface framework are generality, reusability and scalability in a specific area. First discussed the characters of mobile platforms, devices and the applications running on them. From the overall analysis for the mobile device application software, we propose the testing approach and design the testing interface. Then based on the COM technique with the goal to design SOA based Interface to test application software of mobile device as a type of embedded system we introduce the new thought of service-oriented architecture. During the design, we have to focus on the technical implementation of this interface definition and design. Finally this interface is built and used to test application software of mobile device. At last the test results show that this testing interface provide a good foundation for the mobile device test and improved the testing flexibility.

The objectives of Mobile application software Testing are as follows:

- ❖ Functionality
- ❖ Usability
- ❖ Security
- ❖ Performance
- ❖ Conformity

IV.   LITERATURE REVIEW

In the year 2007, Sun-Myung Hwang, Hyeon-Cheol Chae proposed "Design & implementation of mobile GUI testing tool**".** In this paper, GUI test was defined using tool. Most important design part with those users easily operate the software functions of this particular embedded system is the GUI. Since it established as an important factor of software success which needs the GUI test. But this test takes much efforts and time.

In the year 2007, as Myung-Hee Lee,1, Cheol-Jung Yoo1, Ok-Bae Jang proposed   "Embedded System Software Testing Based On SOA For Mobile Service" To classify and assess technical realizations of business processes embedded system service offers a systematic way. As rapidly increasing the number of embedded systems, for various applications there has been a growing demand with the use of Service Oriented Architecture (SOA). But embedded system has restricted range of utilizing services in computing environment. A mobile computer is envisioned to be equipped with more powerful capabilities, including, the capacity of data processing, and the storage of a small database, a narrow user input and small size of display. The need of a driving force for a variety of mobile applications is for accessing information from anywhere at any time This paper present testing of embedded system software to overcome mobile restriction based on SOA.

In the year 2009, as Zhi- fang LIU, Bin LIU, Xiao-peng GAO proposed "SOA Based Mobile Application Software Test Framework" in a specific area the framework for test having constantly updates and improves in mobile application software makes it difficult for these points. Some issues of the test are there, which are important are its, reusability, generality and scalability present in this paper .This paper first proposes the definition of mobile device application software, its classification, and summarizes the testing technology. Then we introduce service-oriented architecture into this area using COM technique with the goal of designing a mobile application software test framework. During the design, we focus on the technical implementation and interface definition. Finally a test platform is built based on the framework and used to test typical software of mobile phone. The test result shows that the test framework greatly improved the testing flexibility by provided a good foundation for expansion and implementation of application device test.

V. SYSTEM ARCHITECTURE

1. Mobile Device Test Design

It's natural that Mobile Application software testing is more complex than the desktop or web applications. Due to the mobile with different applications goes smarter than day by day so its need more powerful testing platform to do successful application software testing and give the correct result. The Environment, Testing levels, Scope and Techniques of the Testing are the important body parts of the Mobile Application Test Matrix.
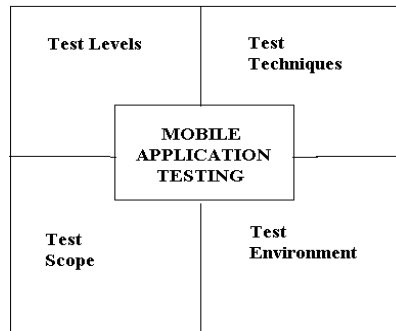
Fig.1. Mobile Application Test Matrix

Following are the different traditional software testing approaches:
• Record/Playback approach: Record the different events which are already played and stored to playback it again.
• Capture/Playback approach: In that user can easily notify that which test events are replayed.
• Particulars-Based Test approach: This is the document based approach which contains all necessary factors.
• Beta Test approach: This the most popular testing approach use by the common user at beta version.
From the analysis we have to design one mobile testing platform with the following characteristics:
• Design different modules of this framework according to the mobile device features.
• To increase the flexibility of this architecture design one common communication interface between different modules using components.
• Construct different functional modules for the verification during testing.
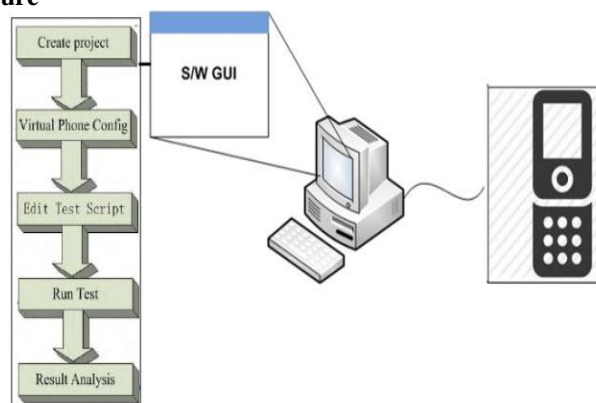
2. System Architecture

Fig. 2. System Architecture

In the system architecture mobile connects to the personal computer that contains the SOA based interface which is a Graphical User Interface. That SOA based testing GUI is the distributed architecture consisting different modules e.g. connectivity, testing, report etc. which are internally connects to one another. These modules are based on COM (Component Object Model). This GUI testing module contains different test cases to test mobile device or to monitor the mobile device. Run the test cases and the report module will show the result of test.

VI.   METHODOLOGY
SOA Based Interface Design

Here in this paper, we are going to used combination of two Test approaches as Capture/Playback and Particulars-Based and at the same time script-driven test method. Then based on the test methods first we have to design different test cases and write this in one particular programming language and at last run the test cases to get the result in one report format.

A.   Basic Components of SOA
Following are the three components of SOA:
- o   Service provider
- o   Service consumer
- o   Service registry

Each component can also act as one of the two other components. If a service provider needs additional information that it can only access from another service and acts as a service consumer.

- The service provider creates a service and within some test cases publishes its interface to access information to a service registry.
- The service registry is responsible to access information available to service consumers making the use of service interface.
- The service consumer to invoke the defined service in the database.

it binds to the service provider and service registry locates different entries
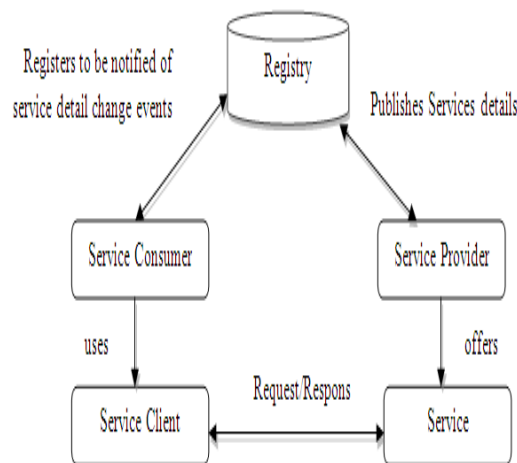

Fig.3. SOA Components

B.   Division and design of Components Based On COM

COM is nothing but Component Object Module which is basically used for code sharing purpose. SOA is a composition of different modules connected to each other of distributed architecture which can easily communicate with each others. We have to build different independent components for different services using COM technique for the communication interface between those modules. This makes the component location in the test platform transparent as the self registration feature make easy communication between modules or the components. This Component- based architecture can easily upgrade and improve flexibility. It is always able to import new module to improve itself.

C.   Interface Design

To design the SOA interface we have to analyze different interface parameters. Then make different components based on that parameter. These components are work under the module. One module can communicate with the other through this interface which is based on the components. Suppose one register module is their which communicate with the service module by using this interface to register the different query by different users. Interface passes the component values to other module to communicate and give result.

D. Implementation of the SOA Interface

SOA is a composition of different modules connected to each other of distributed architecture which can easily communicate with each others. This architecture is based on the component object module to reuse the data and it increases the scalability and flexibility .Implementations of the SOA interface to test the mobile device first have to analyze all the factors which affect on this testing. Need to design different application software test modules of for service components, test cases, data management which supports one another during test flow. Implementation of the mobile application software testing framework needs to build SOA modules of management and organization, and design basic service components, which supports the test flow. It mainly includes the project management related components line project manager, script editor, database manager and designs one common communication interface between different modules.

Fig.4. SOA Interface

E. A Fault Taxonomy for Service-Oriented Architecture

SOA is a very popular architecture design style. SOA having different steps which are as following:
1. Publishing
2. Discovery
3. Composition
4. Binding
5. Execution

Here we are using fault injection technique. Fault injection is a method to test system for fault reliability and tolerance.

1) We identify possible or expected faults following our taxonomy.
2) Then, we inject the faults in the system, and, finally, we design test cases that are specially designed to find these faults. Obviously, the success of such test cases is depends on the quality of the fault taxonomy. This different faults are occur during this different SOA steps which are shown in the following fig.5
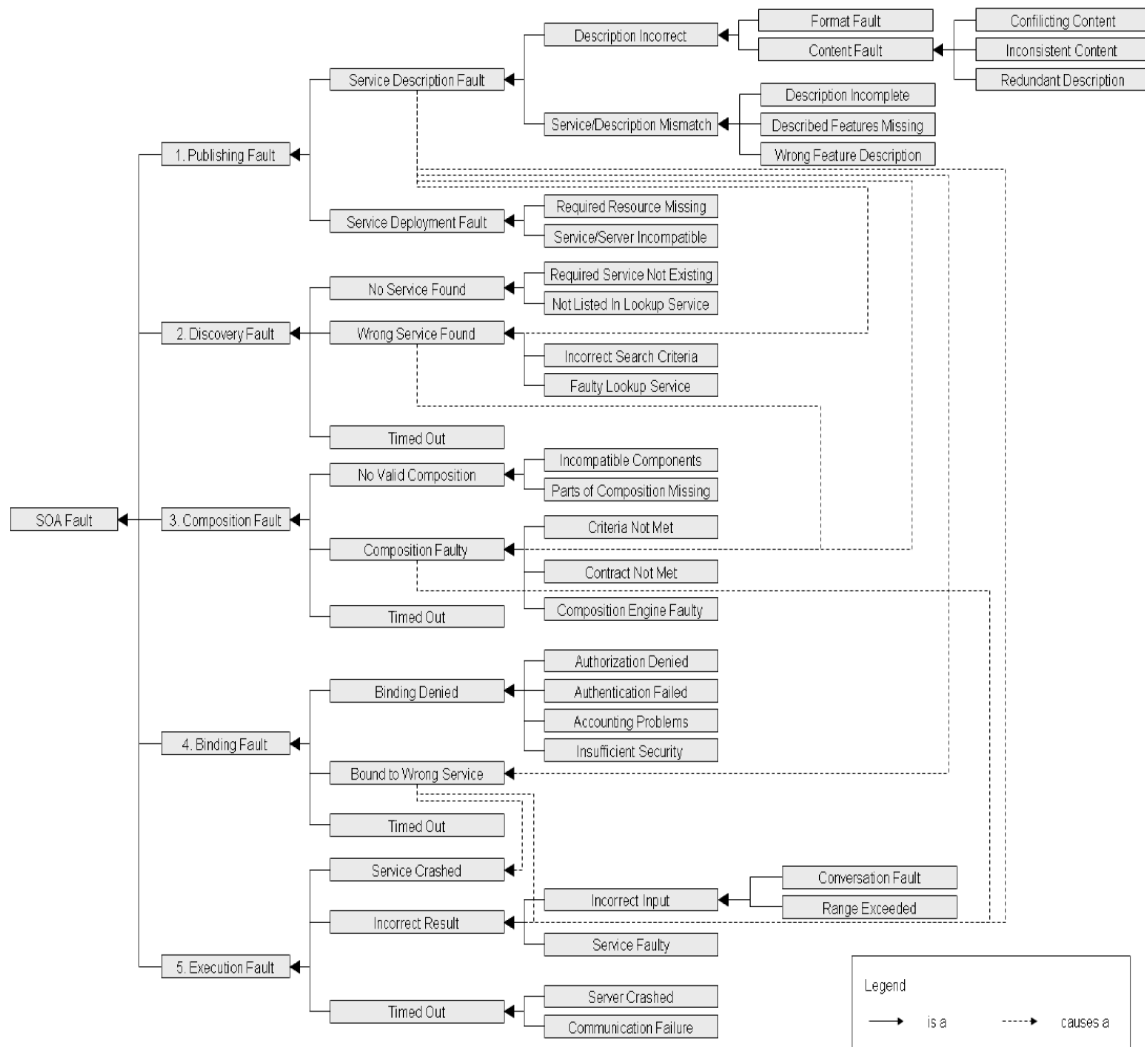
Fig.5 SOA-Specific Faults

In this project we are going to create one SOA interface which consist different services which we are going to access. As shown in fig.4 first two services are used to identify the all SOA specific faults ans the third mobile discovery service is use as one application which used to test the mobile device.

VII.   CONCLUSION

Fault injection is a valid approach to examine the common fault detection mechanisms. The main benefit of our work is the identification of typical possible SOA-specific faults. The service invocation process consist five different steps which allow service discovery. The Stated faults knowledge is essential for testing. Testing is the commonly used support measure for high assurance of reliability, availability, and security. Testing via fault injection aims to cover as many fault classes a few test cases.

REFERENCES

[1]   Jiang Bo, Long Xiang, Gao Xiaopeng "MobileTest: A Tool Supporting Automatic Black Box Test for Software onSmart Mobile Devices" 2007.
[2]   Sun-Myung Hwang, Hyeon-Cheol Chae1" Design & Implementation of Mobile GUI Testing Tool" 2008.
[3]   LIU Zhi-fang, GAO Xiao-peng "SOA Based Mobile Device Test" 2009.
[4]   Myung-Hee Lee,1, Cheol-Jung Yoo1, Ok-Bae Jang1 "Embedded System Software Testing Based On SOA For Mobile Service" .
[5]   Zhi-fang LIU, Bin LIU "SOA Based Mobile Application Software Test Framework" .
[6]   Stefan Br¨uning, Stephan Weißleder and Miroslaw Malek "A Fault Taxonomy for Service-Oriented Architecture".